

What is claimed is :

1. A method of managing the operation of semiconductor manufacturing equipment comprising the steps of:
  - 5 sampling a plurality of data of at least one parameter under a normal operating condition of said semiconductor manufacturing equipment;  
generating a Mahalanobis space on the basis of a group of sampled data;  
calculating, on the basis of said Mahalanobis space, a Mahalanobis  
10 distance from a group of measured values of said parameters under the actual operating condition of said semiconductor manufacturing equipment; and  
when a calculated Mahalanobis distance exceeds a predetermined value, making a decision that a malfunction occurred in said semiconductor manufacturing equipment.
- 15 2. A management method according to Claim 1, further comprising the steps of:
  - sampling a plurality of data under abnormal conditions each abnormal condition being generated by setting one parameter at an abnormal value and other said parameters at normal values;
  - 20 generating Mahalanobis spaces under said abnormal conditions;  
when, from a value of said Mahalanobis distance, a decision has been made that a malfunction occurred, calculating Mahalanobis distances corresponding to Mahalanobis spaces from said measured values, on the basis of said Mahalanobis space under the abnormal condition; and
  - 25 estimating that among said plurality of parameters, abnormality occurred in a parameter that gave a Mahalanobis space such that said Mahalanobis distance is closest to 1.

3. A management method according to Claim 1, wherein said at least one parameter is a plurality of mutually different parameters, said management method further comprising generating Mahalanobis spaces at predetermined times from a data group of said plurality of parameters measured at  
5 predetermined times, and calculating Mahalanobis distances at predetermined times from a group of measured values of said plurality of parameters, obtained from the operating condition of said semiconductor manufacturing equipment by using said Mahalanobis spaces formed at predetermined times.
4. A management system of semiconductor manufacturing equipment  
10 comprising: ✓  
a memory unit for storing data on a Mahalanobis space obtained from a parameter showing a normal operating condition of semiconductor manufacturing equipment;  
a detection mechanism for obtaining data values of said parameter  
15 from said semiconductor manufacturing equipment in operation;  
an arithmetic circuit for calculating a Mahalanobis distance from a data group of said parameter, obtained by said detection mechanism by using said Mahalanobis space stored in said memory unit; and  
a circuit for deciding whether or not a calculated value of said  
20 Mahalanobis distance by said arithmetic circuit exceeds a predetermined value.
5. A management system according to Claim 4, wherein said semiconductor manufacturing equipment is a plasma etching system utilizing plasma emission, and wherein said detection mechanism is a plasma emission  
25 intensity detector for measuring the intensity of a desired wavelength of the plasma emission of said etching system.
6. A management system according to Claim 4, wherein said

semiconductor manufacturing equipment is a plasma etching system equipped with a high frequency oscillator for plasma emission, and wherein said detection mechanism includes a current detector and a voltage detector for obtaining a current value, a voltage value, and a phase of high frequency  
5 output of said high frequency oscillator.

7. A management system according to Claim 6, wherein said detection mechanism further includes a data converter for calculating current values, voltage values and phases of a fundamental wave and harmonics of said high frequency output, from a current value and a voltage value detected by said  
10 current detector and said voltage detector.

8. A management system according to Claim 4, wherein said semiconductor manufacturing equipment is a plasma etching system utilizing plasma emission, and wherein said detection mechanism further includes an emission spectrometer for measuring the intensity of a plurality of desired  
15 wavelengths of plasma emission of said etching system.